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HORNING, JOEL G	

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte TUAN NGUYEN, EASHWAR RANGANATHAN, SHANKAR SWAMINATHAN, ADRIEN LAVOIE, CHLOE BALDASSERONI, RAMESH CHANDRASEKHARAN, FRANK L. PASQUALE, and JENNIFER L. PETRAGLIA

Appeal 2019-005738
Application 14/720,595
Technology Center 1700

Before JOSEPH L. DIXON, DONNA M. PRAISS, and BRIAN D. RANGE, *Administrative Patent Judges*.

DIXON, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Pursuant to 35 U.S.C. § 134(a), Appellant[1] appeals from the Examiner's decision to reject claims 1 and 3–15. Claims 2 and 16–42 are canceled. We have jurisdiction under 35 U.S.C. § 6(b).

We REVERSE.

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[1] We use the word Appellant to refer to "applicant" as defined in 37 C.F.R. § 1.42(a) (2018). Appellant identifies the real party in interest as Lam Research Corporation. Appeal Br. 3.

CLAIMED SUBJECT MATTER

The claims are directed to a fill on demand ampoule method that will refill an ampoule with precursor concurrent with the performance of other deposition processes using a secondary fill stop condition that involves determining when the cumulative time of filling exceeds a threshold. Abstract; Spec. ¶ 5. Claim 1, reproduced below, is illustrative of the claimed subject matter:

> 1. A method for filling an ampoule of a substrate processing apparatus, the method comprising:
>
> (a) determining that an ampoule fill start condition for filling the ampoule with a liquid precursor is met;
>
> (b) filling the ampoule with precursor, wherein filling the ampoule with the precursor is performed concurrent with at least one other substrate processing operation;
>
> (c) determining that a sensor level in the ampoule indicates that the ampoule is not full, wherein a primary fill stop condition is met when the sensor level in the ampoule indicates that the ampoule is full;
>
> (d) maintaining a cumulative time of filling the ampoule, wherein the cumulative time of filling the ampoule is all of the time that precursor is flowing to the ampoule since the cumulative time of filling the ampoule was last reset, wherein the cumulative time of filling the ampoule is reset when the sensor level in the ampoule indicates that the ampoule is full;
>
> (e) determining that a secondary fill stop condition is met, wherein the secondary fill stop condition comprises determining that the cumulative time of filling exceeds a threshold; and
>
> (f) in response to determining that the secondary fill stop condition is met and in response to determining that the sensor

level in the ampoule indicates that the ampoule is not full, ceasing the filling of the ampoule with the precursor.

REFERENCES

The prior art relied upon by the Examiner is:

Kuckens et al.	US 3,669,312	June 13, 1972
Ludwig	US 2005/0173016 A1	Aug. 11, 2005
Paranjpe et al.	US 2012/0216712 A1	Aug. 30, 2012
Yudovsky et al.	US 2015/0299858 A1	Oct. 22, 2015

REJECTIONS

Claim 5 stands rejected under 35 U.S.C. § 112(b) as being indefinite for failing to particularly point out and distinctly claim the subject matter which the inventor or a joint inventor regards as the invention.

Claims 1 and 4–15 stand rejected under 35 U.S.C. § 103 as being unpatentable over Yudovsky in view of Paranjpe in view of Kuckens.

Claim 3 stands rejected under 35 U.S.C. § 103 as being unpatentable over Yudovsky, Paranjpe, and Kuckens further in view of Ludwig.

OPINION

35 U.S.C. § 112(b)

The Examiner finds that the claim term "soft shutdown" in claim 5 is a relative term which renders the claim indefinite because the term "soft shutdown" is not defined by the claim, the Specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. Final Act. 3.

Appellant contends that the phrase "soft shutdown" is not an indefinite term because the Specification concretely describes this phrase in

two full paragraphs with the heading "Soft shutdown." Appeal Br. 7; *see* Spec. ¶¶ 84, 86, 87.

The Examiner further finds that claim 5 is unclear "how hard a shutdown needs to be in order to not be a 'soft shutdown' (and that is even if it was known in which metric softness was measured for this purpose). The metes and bounds of the claim are unclear and claim 5 is indefinite." Ans. 3.

The test for definiteness is whether "those skilled in the art would understand what is claimed when the claim is read in light of the specification." *Orthokinetics, Inc. v. Safety Travel Chairs, Inc.*, 806 F.2d 1565, 1576 (Fed. Cir. 1986). Language in a claim is unclear if, when given its broadest reasonable interpretation, it "is ambiguous, vague, incoherent, opaque, or otherwise unclear in describing and defining the claimed invention," *In re Packard*, 751 F.3d 1307, 1311 (Fed. Cir. 2014), or if it is "is amenable to two or more plausible claim constructions," *Ex parte Miyazaki*, 89 USPQ2d 1207, 1211 (BPAI 2008) (precedential).

We agree with Appellant that the claim term "soft shutdown" is not indefinite. From the multiple examples set forth in the Specification, skilled artisans would understand what is claimed when the claim is read in light of the Specification. The Specification makes clear that a "soft shutdown" is less than a "hard shutdown" which results in an immediate and sudden shutdown. Spec. ¶ 86.

35 U.S.C. § 103

Claims 1 and 4–15

Appellant argues claim 1 provides an ampoule and/or associated apparatus capable of making the determinations of claim 1. Such

ampoule/apparatus would have to include (i) functionality for maintaining a cumulative time of filling, (ii) functionality for determining that the cumulative time of filling exceeds a threshold, and (iii) a sensor level in the ampoule capable of indicating that the ampoule is not full. Appeal Br. 7–8.

Specifically, Appellant contends that the prior art does not teach or suggest "us[ing] both determinations of clauses (c) and (e) of claim 1 for some purpose, as recited in clause (f). Clearly, the art does not suggest such operation, and particularly does not suggest using the recited combination of determinations for the purpose of 'ceasing the filling of the ampoule.'" Appeal Br. 8; *see generally* Reply Br. 3–6.

The Examiner maintains that the Kuckens reference teaches counting with a timer and dispensing fluid until the duration reaches a threshold (a total cumulative filling time, where the timer restarts for the next filling operation) which ends the flow of fluid, in order to produce very controlled amounts of fluid to be dispensed. Final Act. 6. Additionally, the Examiner relies upon extrinsic evidence to define the terms "fill level" and "overfill level" as used by Paranjpe, specifically API 2350 "Overfill Protection for Storage Tanks in Petroleum Facilities" 49 CFR 195.428(c). Ans. 4–5. Appellant contends that the Examiner had ample opportunity to present the new evidence earlier and that the Examiner failed to establish this new evidence is combinable with the Paranjpe reference. Reply Br. 6.

We agree with Appellant and find that the Examiner did not rely upon terms "fill level" and "overfill level" as being well-known in petroleum storage facilities in the grounds of the rejection. *See In re Hoch*, 428 F.2d 1341, 1342 n.3 (CCPA 1970) ("Where a reference is relied on to support a rejection, whether or not in a 'minor capacity,' there would appear to be no

excuse for not positively including the reference in the statement of the rejection."). As a result, we do not consider the Examiner's extrinsic evidence concerning petroleum storage facilities in combination with the cited prior art references concerning multiple level determinations in refilling an ampoule.

The Examiner's rejection is based upon an end-use dispensing metered volumes of fluid (milk) and the corresponding use of a timer during dispensing. Ans. 7–8. The Examiner's reliance on Kuckens' "dispensing" to reject the claimed "refilling" an ampoule using a timer in combination with fill sensors is not supported by sufficient reasoning. We agree with Appellant that the limited timing circuitry of the Kuckens reference does not teach or suggest the use of a cumulative time as required by claim 1. Although the Kuckens reference teaches time as a variable in control of fluid flow and capacity, the Examiner has not provided sufficient reasoning for using a cumulative time of fluid flow in the refilling process of an ampoule as claimed.

Appellant further argues that "the Examiner takes too many logical leaps from the cited references." Reply Br. 6. We agree with Appellant that the Examiner has not adequately explained how the references describe or support the Examiner's conclusions. *Id.*

At best, the Paranjpe reference discloses the use of two values in determining refill of precursor delivery system, where the:

> precursor delivery system may also have provisions for connecting an external bulk-refill system **650** that periodically fills the ampoule from an external tank **652** having a solution **654.** To enable automated operation, the ampoule may have one or more level sensors **656** that allow the user to set the low, high

> and overfill (alarm) levels. This is *in addition to*, or instead of, the pressure gage **617** that may also serve a similar function.

Paranjpe ¶ 89 (emphasis added). The Examiner does not adequately explain why a person having ordinary skill in the art would have replaced Paranjpe's pressure gage with Kuckens' timer circuitry where the timer in the combination with Paranjpe would use cumulative time as a failsafe alarm for refilling the uses cumulative time as a failsafe alarm for refilling an ampoule of independent claim 1.

As a result, Appellant's arguments identify error in the Examiner's factual findings and conclusion of obviousness based upon the proffered combination of prior art teachings. Accordingly, we do not sustain the rejection of independent claim 1 and dependent claims 4–15 as set forth by the Examiner in the rejection.

Claim 3

With respect to dependent claim 3, Appellant argues that "modifying Kuckens with Ludwig improperly changes the principle of operation of Kuckens." Appeal Br. 14.

Appellant contends that the Examiner has not provided any rationale regarding "tailing" and the proffered rationale that

> it would have been obvious to . . . interrupt the step of dispensing the source material into the ampoule in the process of Yudovsky in view of Paranjpe in view of Kuckens in order to be able to measure the tail and thus more accurately dispense the amount of liquid required into the ampoule [is unsupported].

Appeal Br. 13–14 citing Final Act. 9–10.

The Examiner relies upon the Ludwig reference to teach and suggest a refilling in two distinct refill steps rather than a single step, but the Examiner has not identified how the Ludwig reference teaches or suggests the claimed

"wherein the *cumulative time* of filling is temporarily stopped one or more times when ampoule refill temporarily ceases and deposition commences, but the *cumulative time* of filling resumes when filling starts again." (Emphases added). Nor does the Examiner identify how the Ludwig reference remedies the noted deficiency in the base combination. As a result, we cannot sustain the Examiner's obviousness rejection of dependent claim 3.

CONCLUSION

The Examiner's indefiniteness rejection is reversed and the Examiner's obviousness rejections are reversed.

DECISION SUMMARY

In summary:

Claims Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
5	112(b)	Indefiniteness		5
1, 4–15	103	Yudovsky, Paranjpe, Kuckens,		1, 4–15
3	103	Yudovsky, Paranjpe, Kuckens, Ludwig		3
Overall Outcome				1, 3–15

REVERSED